□□□2021□1□□□□

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A. N□s　　B. N□m/s　　C. kg□m/s　　D. kg□m^2/s^3

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□□□□A□N□□□□□□□□□□□□□□□□□□□□$I=Ft$□□□$N\cdot s$□□□□□□□□A□□□

B□□□□□□□□□□$P=Fv$□□□□□□□□□□□□$N\cdot m/s$□□□N□□□□□□□□□□□□□B□□□

C□□□□□□□□$p=mv$□□□$kg\cdot m/s$□□□□□□□C□□□

D□□□$P=Fv$□□□□□□□□□□□□$N\cdot m/s$□□□$F=ma$□□$N=kg\cdot m/s^2$□□□□□□□

$$W=N\cdot m/s=kg\cdot m^2/s^3$$
□D□□□

□□D□

2. 2020□12□□□□□□□□□□□□□□□□□□□□□□□□□□□□□76□□□100□□□□□□□□“□□”□□□□“□□□□□□”□□□□□□□□□□□□□□“□□”□□□□□□□□□□□□□□□□□□□□□（　　）

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3. 2020□11□10□□□□“□□□”□□□□□□□□□□□□□□□□□□□□□□10909m□“□□□”□□□□□□□

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D. □□□□□□□□□□□□□□□□□□□□□□□□□

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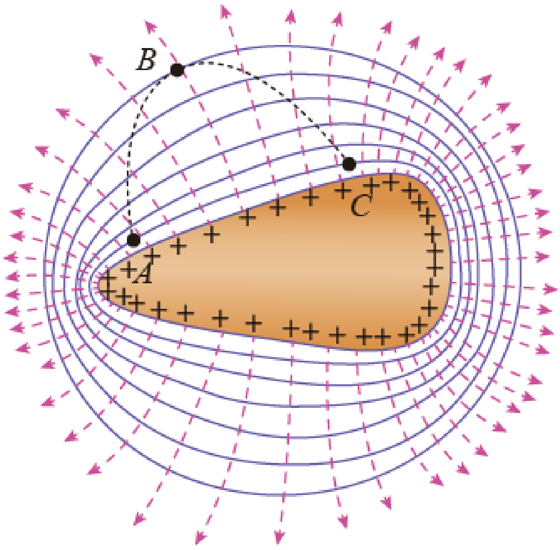
B□□B □□□

CD□□□□□□□□□□□□□□□□□□□□□□□□□C □□□D □□□

□□ D□

5. □□□□□□□□□□□□□□□□□A□C□□□□□□□□B□□□□□□□□□□□□□□□ 　　□



A. □□□□□□□□□□

B. A□C□□□□□□B□□□

C. B□□□□□□A□□□□

D. □□□A□□□□□B□□□□□□□□□

□□□□

□□□□D

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[illegible]

[illegible]A[illegible] 0[illegible]A [illegible]

B[illegible] A[illegible]C [illegible] B [illegible]B [illegible]

C[illegible] B [illegible] A [illegible]C [illegible]

D[illegible] $E_p = q\varphi$ [illegible] A [illegible] B [illegible]D [illegible]

[illegible] D[illegible]

6. [illegible]

[illegible]（　　）

A. [illegible]

B. [illegible]

C. [illegible]

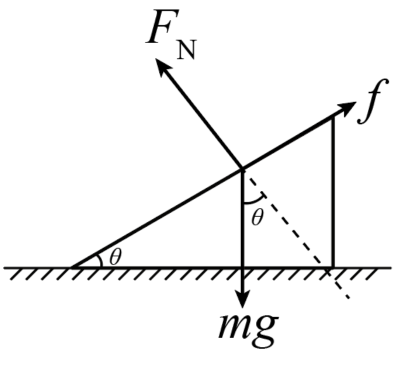
D. [illegible]

[illegible]C

[illegible]

[illegible]

[illegible]A[illegible]



[illegible]

$$a = \frac{mg\sin\theta - \mu mg\cos\theta}{m} = g\sin\theta - \mu g\cos\theta$$

[illegible] μ [illegible]A [illegible]

B[illegible]B [illegible]

C[illegible] $x=\frac{1}{2}at^2$ [illegible]

[illegible]C [illegible]

D[illegible] $mg\sin\theta$ [illegible]D [illegible]

[illegible] C[illegible]

7. [illegible]

[illegible] G=6.67×10^{-11}N[illegible]m^2/kg^2 [illegible] m=6.0×10^{24}kg[illegible]

m_2=7.3×10^{22}kg[illegible] r_1=3.8×10^5km[illegible] r_2=1.7×10^3km[illegible]

[illegible] 200km [illegible] [illegible]

A. 16m/s B. 1.1×10^2m/s C. 1.6×10^3m/s D. 1.4×10^4m/s

[illegible]C

[illegible]

[illegible]

[illegible]

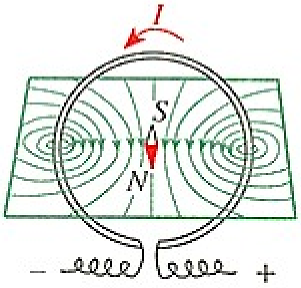
$$G\frac{m_2m}{r^2}=m\frac{v^2}{r}$$

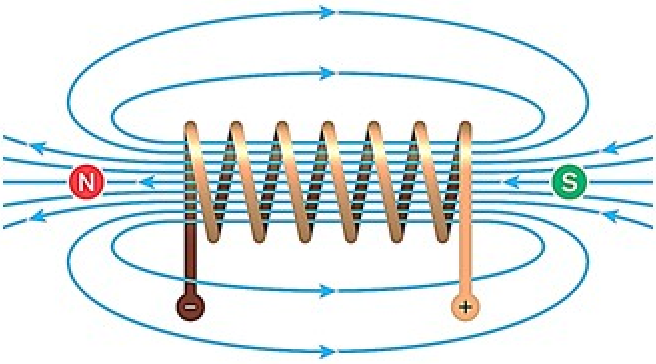
[illegible]

$$v=\sqrt{\frac{Gm_2}{r}}=\sqrt{\frac{6.67\times10^{-11}\times7.3\times10^{22}}{(1.7\times10^3+200)\times10^3}}\text{m/s}=1.6\times10^3\text{m/s}$$

[illegible] C[illegible]

8. [illegible] [illegible]





A. □□□□□□□□□□□□□□□□□

B. □□□□□□□□ □□□□□□□□□

C. □□□□□□□□□□□□□□□□□□□□

D. □□□□□□□□□□□□□□□□□□□□

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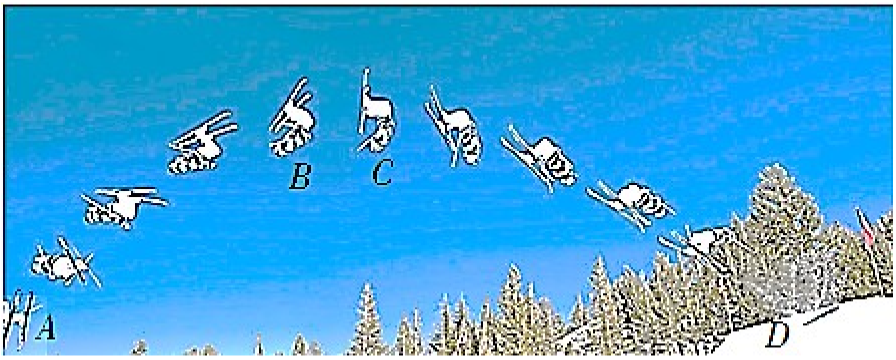
9. □□A□B□C□D□□□□□□□□A□D□□□□□□□□□□□□□□□□□□（ ）



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B. □□□□A□D□□□□□□□□□□

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D. □□□□□□□□□□□□□B□C□□

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B□□□□□□A□D□□□□□□□□□□□□□□□□□□□□□□□□□□□B□□□

C□□□□□□□□□□A□B□$4\Delta t$□□C□D□□□□$5\Delta t$□□□□□□□□□□□C□□□

D□□□□□□□□□□□□□□□□□C□□□□D□□□

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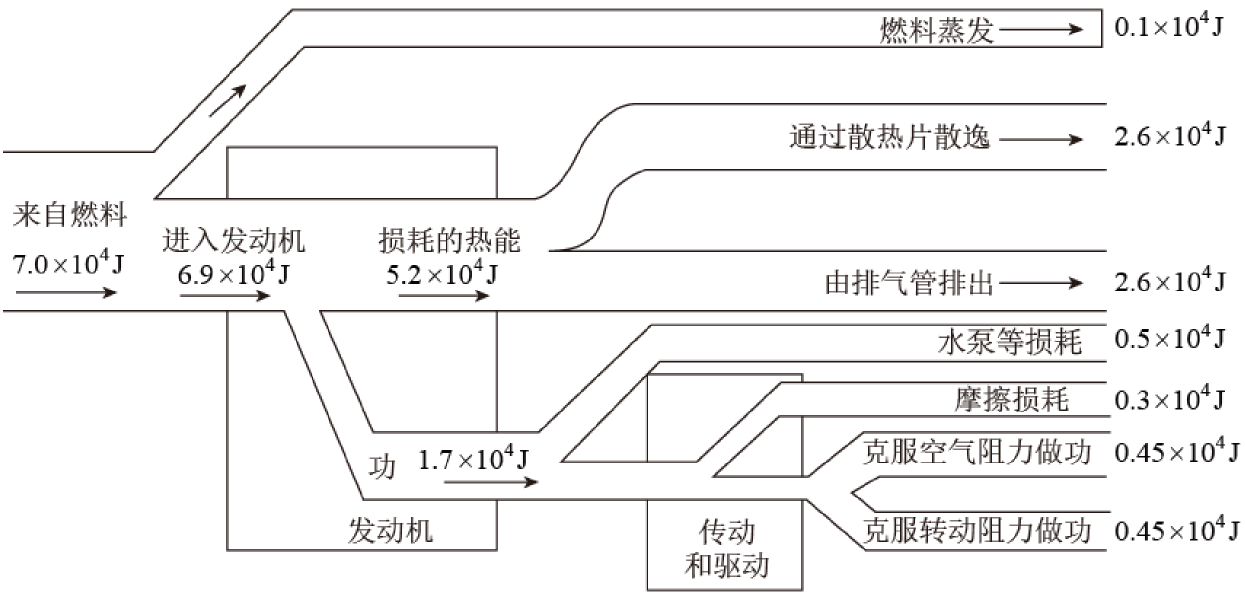
11. □□□□□□□□□□□□□□□□□80km/h□□□□□□□□□□□□1s□□□□□□□□□□□□□□□□□□（　　）



A. □□□□□□□□□70kW

B. □1s□□□□□□□□□□□□□□5.7×10^4J

C. □1s□□□□□□□□□□□□□□6.9×10^4J

D. □1s□□□□□□□□□□□□□□7.0×10^4J

□□□□C

□□□□

□□□□

□□□□A□□□□□□□□□1s□□□□□□□□□□0.45×10^4J□□□□□□□

$$P=\frac{W}{t}=\frac{0.45\times10^4}{1}\text{W}=4.5\text{kW}$$

□□A□□□

BCD□□1s□□□□□□6.9×10^4J□□□□□□□□□□□□□□□□□□6.9×10^4J□□□C□□□BD□□□

□□C□

12. □□□

□□□2:1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5s□□6s□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□340m/s□□□□□□□□□□□□□□□□□ □

A. □□□□□□□□□□□1:2

B. □□□□□□□□□□□□□80m

C. □□□□□□□□□□□□□□68m/s

D. □□□□□□□□□□□□□□□□□340m

□□□□B

□□□□

[illegible]

[illegible]A[illegible]

$$m_1v_1 - m_2v_2 = 0$$

[illegible]

$$m_1x_1 - m_2x_2 = 0$$

[illegible]

$$\frac{x_1}{x_2} = \frac{m_2}{m_1} = \frac{1}{2}$$

[illegible]1:2[illegible]1:2[illegible]A[illegible]

B[illegible]t[illegible]

$$\frac{(5-t)v_{\square}}{(6-t)v_{\square}} = \frac{1}{2}$$

[illegible]

$$t=4\text{s}$$

[illegible]

$$h = \frac{1}{2}gt^2 = \frac{1}{2}\times 10\times 4^2\text{m} = 80\text{m}$$

[illegible]B[illegible]

CD[illegible]

$$x_1 = (5-4)\times 340\text{m} = 340\text{m}$$

[illegible]

$$x_2 = (6-4)\times 340\text{m} = 680\text{m}$$

[illegible]340m+680m=1020m

[illegible]

$$v_{10} = \frac{x_1}{t} = \frac{340}{4}\text{m/s} = 85\text{m/s}$$

[illegible]CD[illegible]

[illegible]B[illegible]

13. [illegible]Ⅰ[illegible]Ⅱ[illegible]0.48m[illegible]A[illegible]B[illegible]

□□□□□□□□□1□2□3□4□5 □□□□□□□□□□□1 □ 5 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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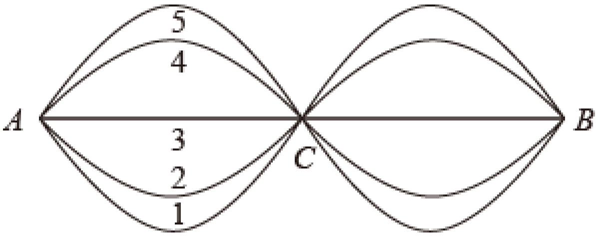

A. □□□Ⅰ□Ⅱ□□□□□0.24m

B. □□□Ⅰ□Ⅱ□□□□□0.48s

C. □□□□□□□□□□□□□□□

D. □□□□A□□C□□□□□□□□□□□□0.48m

□□□□D

□□□□

□□□□

□□□□A□□□□Ⅰ□Ⅱ□□□□□0.48m□□□A□□□

B□□□□1□□□5□□□□□□$\frac{1}{2}T$□□

$$\frac{1}{2}T=4\times0.12\text{s}$$

□□□□□Ⅰ□Ⅱ□□□□□□

$$T=0.96\text{s}$$

□□B□□□

C□□□□□□□□□□□□□□□□□□□□□□C□□□

D□AC□□□□□□□□□□□□□□□□□□□□□□□□□□$\frac{\lambda}{2}(2n+1)$□$\frac{\lambda}{2}(2n-1)$□□□□□□A□□C□□□□□□

□□□□□□

$$\left|\frac{\lambda}{2}(2n+1)-\frac{\lambda}{2}(2n-1)\right|=\lambda=0.48\text{m}$$

□□D□□□

□□D□

□□□Ⅱ(□□□3□□□□□2□□□6□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

2 □□□□□□□□□ 1 □□□□□□□ 0 □)

14. □□□□□□□□□□□□□□□□□□□□□□2018□11□□□□□□□□1×10^{8}℃□□□□□□□□□□□□□□□□

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B. □□□□□□□□□□□□□□

C. □□□□□□□□□□□□□□

D. □□□□□□□□□□□□□□□□□□□□□□□

□□□□ABD

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B□□□□□□□□□□□□□□□□□□□B□□□

C□□□□□□□□□□□□□□□□□□□□□10^{-15}m□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□C□□□

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15. □□□

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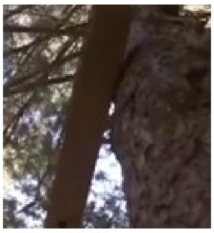

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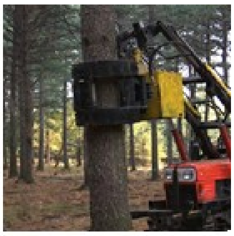

乙

A. □□□□□□□□□□□□□□□□□□□□□□□

B. □□□□□□□□□□□□□□□□□□□□□□

C. □□□□□□□□□□□□□□□□□□□□□□□□□

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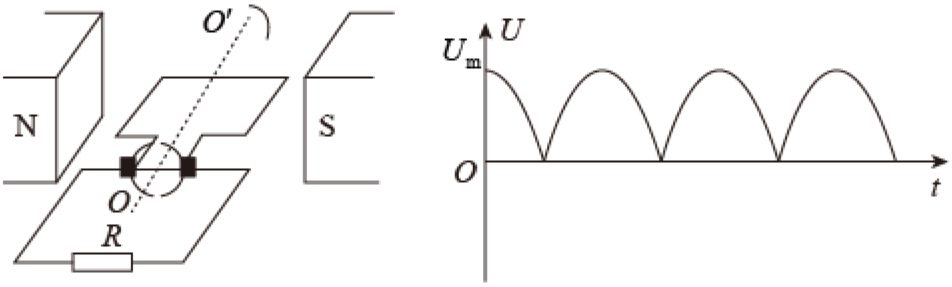
B□□□B□□□

C□□□C□□□

D□□□D□□□

□□AD□

16. □□□□□□□□□□□□□□□□ L □□□□□□□□□□□□□□□ B □□□□□□□□□□□□□□ OO' □□□□□□□ R □□□□□□□□□□□□□□□□□□□□□□□□□□□□ U_m □□□□□□□□□□□□□□□（ ）



甲 乙

A. □□□□□□□□ B. □□□□□□□□ U_m

C. □□□□□□□ $\frac{2BL^2}{R}$ D. □□□□□□□□ $\frac{\pi U_m BL^2}{R}$

□□□□BD

□□□□

□□□□

□□□□A□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□A□□□

B□□□□□□□□□□□□□□□ U_m □□□B□□□

C□□□□□□□□□□□□□□□□□□□

$$q=\bar{I}\Delta t=\frac{\bar{E}}{R}\Delta t=\frac{\Delta\Phi}{R}=\frac{2BL^2}{R}$$

□□□□□□□□□□□□□□□□□□

$$q'=2q=\frac{4BL^2}{R}$$

D□□□

$$U_m=B\omega L^2$$

□

$$\omega=\frac{U_m}{BL^2}$$

□□□□□□□□□□□□ □□□

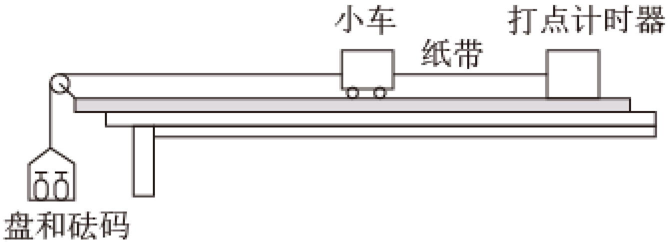
$$Q=\frac{U^2}{R}T=\frac{(\frac{U_m}{\sqrt{2}})^2}{R}\cdot\frac{2\pi}{\omega}=\frac{\pi U_m BL^2}{R}$$

□□D□□□

□□BD□

□□□□□□(□□□6□□□□55□)

17. (1)□□□□□□□□□“□□□□□□□□□□□□”□□



① □□□□□□□□□□□□□□□______□

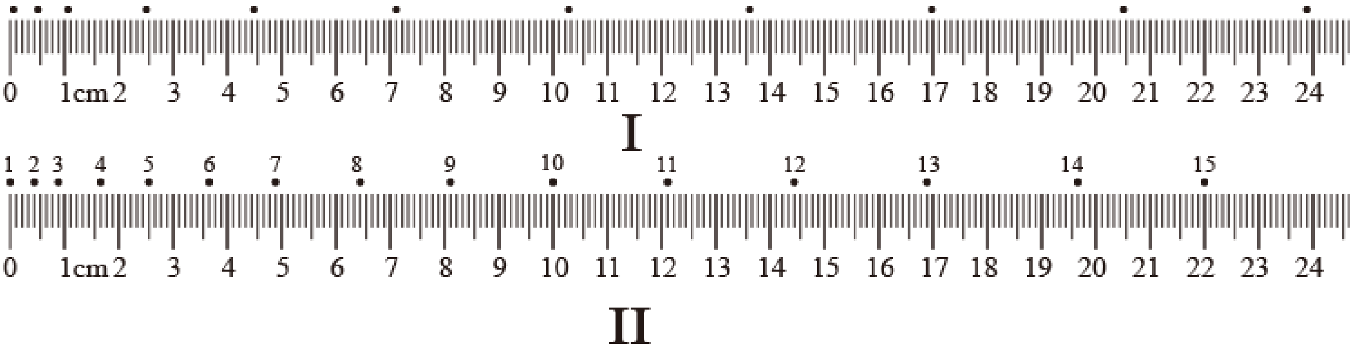
A.□□□□□□□□□□□□□

B.□□□□□□□“□□□□□□□□□”

C.□□□□□□□□□□□□□□□□□□

D.□□□□□□□□ □□□□□□□□□□□

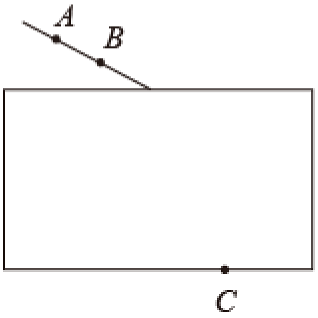
② [illegible] 2 [illegible]______[illegible]"I"[illegible]"II"[illegible]

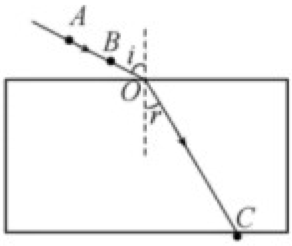


③ [illegible] W-v^2 [illegible]______[illegible]"[illegible]"[illegible]"[illegible]"[illegible]

(2)[illegible]"[illegible]"[illegible] 3 [illegible] A[illegible]B[illegible]C [illegible]

[illegible] i [illegible] r [illegible] n [illegible]____________



[illegible] (1). ACD (2). Ⅱ (3). [illegible] (4). 

(5). $n=\frac{\sin i}{\sin r}$

[illegible]

[illegible]

[illegible](1)[1]A[illegible]

[illegible]A [illegible]

D[illegible] m [illegible]

$$mg-T=ma$$

[illegible] M [illegible]

$$T=Ma$$

[illegible]

$$T=\frac{M}{M+m}\cdot mg=\frac{1}{1+\frac{m}{M}}\cdot mg$$

[illegible]$T=mg$[illegible]D[illegible]

B[illegible]“[illegible]”[illegible]B[illegible]

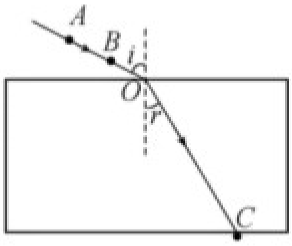
C[illegible]C[illegible]

[illegible]ACD[illegible]

[2][illegible]II[illegible]

[3][illegible]$W=\frac{1}{2}Mv^2$[illegible]$\frac{1}{2}M$[illegible]$W-v^2$[illegible]

(2)[4][illegible]



[5][illegible]$n=\frac{\sin i}{\sin r}$[illegible]

18. (1)[illegible]“[illegible]”[illegible]

①[illegible]$E=$______V[illegible]3[illegible]

$r=$______[illegible]2[illegible]

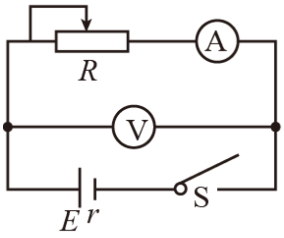


图1

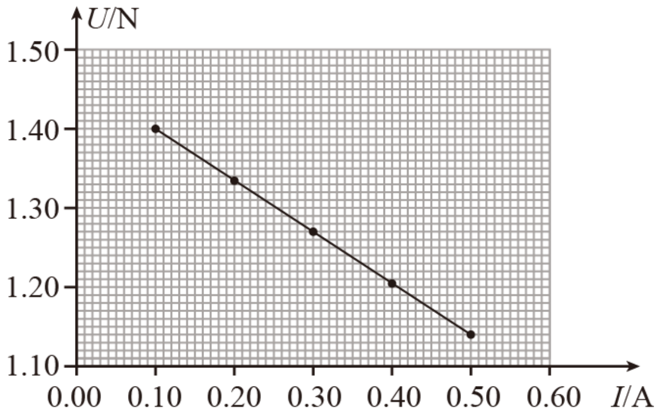


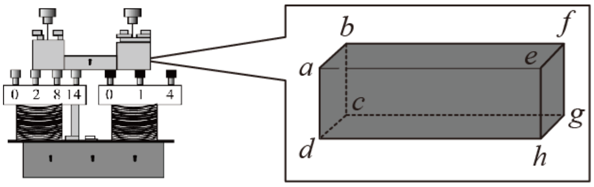
图2

② □□□□□□□□□□□□□□□□□□□□□□□□□□□ 0□9999Ω□□□□□□□□□□□□□□ 0□10Ω□□□□ G □□□□ 0□3mA□□□□ 200Ω□□□□□□□□ 0□3V □ 0□15V□□□□ 3 □□ ______

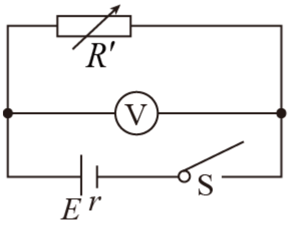
图3

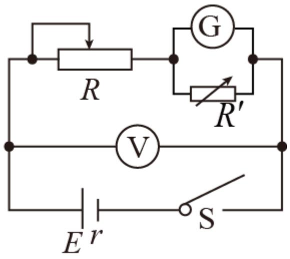
(2)□“□□□□□□□□□□□□□□□□□□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ ______□

A.□□ *abcd*　B.□□ *abfe*　C.□□ *abgh*　D.□□ *aehd*



□□□□　(1). 1.46□1.45~1.47 □□□　(2). 0.64□0.63~0.67 □□□　(3).





(4). D

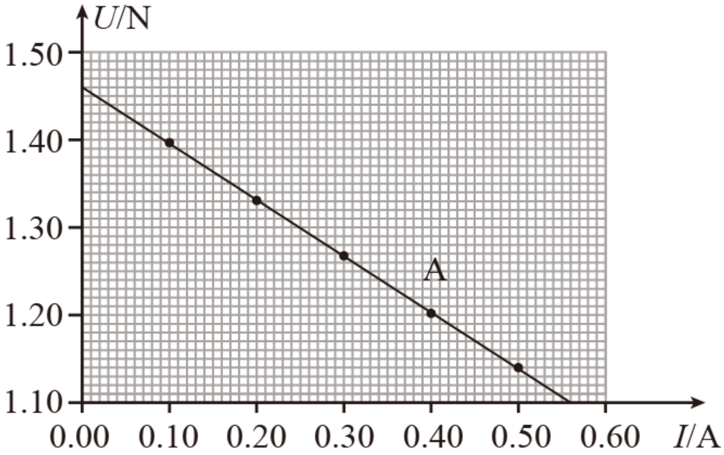
□□□□

□□□□

□□□□(1)①[1]□□□□□□□□□□ $E=U+Ir$ □□

$$U=E-Ir$$

□□□□□□□□□□□□□□□□□□□□



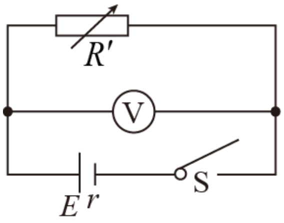
□□□□□□□□□□□□□□□□

$$E=1.46\text{V}$$

[2]□□□□□□□□□□□□□□□

$$r=\frac{1.46-1.10}{0.56}\Omega\approx0.64\Omega$$

②[3]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□



[illegible]

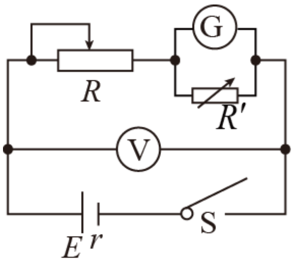
$$E=U+Ir=U+\frac{U}{R}r$$

[illegible]

$$\frac{1}{U}=\frac{r}{E}\cdot\frac{1}{R}+\frac{1}{E}$$

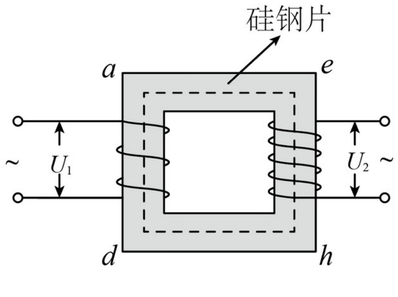
[illegible] $\frac{1}{U}-\frac{1}{R}$ [illegible] $\frac{r}{E}$ [illegible] $\frac{1}{E}$ [illegible]

[illegible]



[illegible] $E=U+Ir$ [illegible] $U-I$ [illegible]

(2)[4][illegible]



[illegible] $aehd$ [illegible] D[illegible]

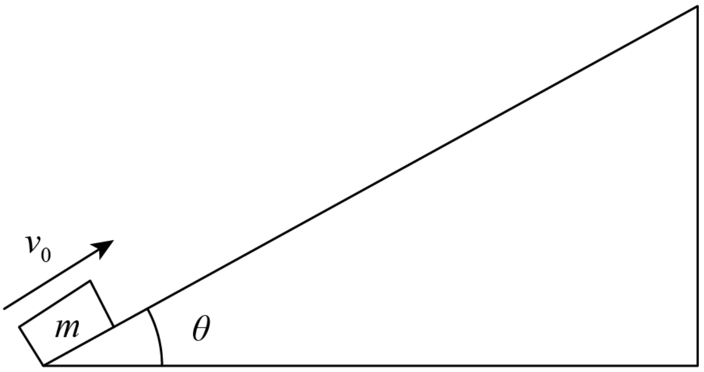
19. [illegible] m=2kg [illegible] v_0=16m/s [illegible] θ=37°[illegible] t=2s [illegible]

[illegible] sin37°=0.6[illegible]cos37°=0.8[illegible]

(1)[illegible] x[illegible]

(2)[illegible]

(3)□□□□□□□□□□□□□□□□□□□□□ P□



□□□□(1)16m□(2)0.25□(3)67.9W

□□□□

□□□□

□□□□(1)□□□□□□□□□□□□□□

$$x=\frac{v_0}{2}t$$

□

$$x=16\text{m}$$

(2)□□□

$$a_1=\frac{\Delta v}{t}=8\text{m/s}^2$$

□□□□

$$a_1=\frac{mg\sin\theta+\mu mg\cos\theta}{m}=g\sin\theta+\mu g\cos\theta$$

□

$$\mu=0.25$$

(3)□□□□

$$a_2=\frac{mg\sin\theta-\mu mg\cos\theta}{m}=g\sin\theta-\mu g\cos\theta=4\text{m/s}^2$$

□□□□□□

$$v_t=\sqrt{2a_2x}=8\sqrt{2}\text{m/s}=11.3\text{m/s}$$

□□□□□□□

$$\overline{P}=mg\bar{v}\cos(90^\circ-\theta)=48\sqrt{2}\text{W}=67.9\text{W}$$

20. □□□□□□□□□□ a=60°□□□□ AB□□□□ R □□□□□□□ $BCDE$ □□□□□□ EFG □□

□□□□□□□□□ B□E □□□□□□□□□□□□□□□□□□□□□ G □□ O_2 □□□□ O_2□E□O_1 □

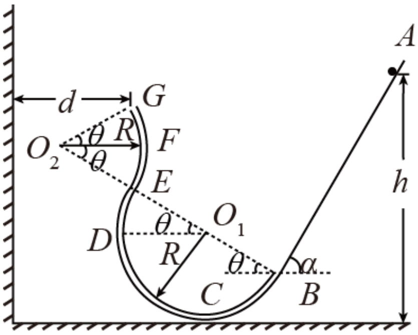
B □□□□□□□□□□□□□ θ=30°□G □□□□□□□□□□□ m □□□□□□□ h □□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□

(1)□□□□□ $h=H$□□□□□□□□□□□ C □□□□□ v_c □□□□□□□□□□□□□□□

(2)□□□□□□□ O_1 □□□ D □□□□ F_N□h □□□□

(3)□□□□□□□□□□□□□□ h □□□□□□□



□□□□(1) $\sqrt{2gh_0}$ □ $m\sqrt{2gh_0}$ □□□□□□(2) $F_N=2mg(\frac{h}{R}-1)$ □$h \geq R$□□(3) $h=\frac{9}{2}R$

□□□□

□□□□

□□□□(1)□□□□□

$$mgh_0=\frac{1}{2}mv_C^2$$

□□

$$v_C=\sqrt{2gh_0}$$

□□□□

$$I=mv_C=m\sqrt{2gh_0}$$

□□□□□□

(2)□□□□□

$$mg(h-R)=\frac{1}{2}mv_D^2$$

[illegible]

$$F_{\mathrm{N}}=\frac{mv_D^2}{R}$$

[illegible]

$$F_{\mathrm{N}}=2mg(\frac{h}{R}-1)$$

[illegible] $h\geq R$

(3)[illegible]1[illegible]:[illegible] $h\leq\frac{5}{2}R$

[illegible]2[illegible] G [illegible]

$$v_x t=v_x\frac{v_y}{g}$$

[illegible] $v_x=v_G\sin\theta$ [illegible] $v_y=v_G\cos\theta$ [illegible]

$$v_G\sin\theta\frac{v_G\cos\theta}{g}=d$$

[illegible]

$$v_G=2\sqrt{gR}$$

[illegible]

$$mg\left(h-\frac{5}{2}R\right)=\frac{1}{2}mv_G^2$$

h [illegible]

$$h=\frac{9}{2}R$$

21. [illegible] B [illegible]“∧”[illegible]“∧”[illegible] ab [illegible] m_1 [illegible] v_0 [illegible]

[illegible]$3r$[illegible]“∧”[illegible]m_2[illegible]

7[illegible]l[illegible]r[illegible]ab[illegible]

[illegible]

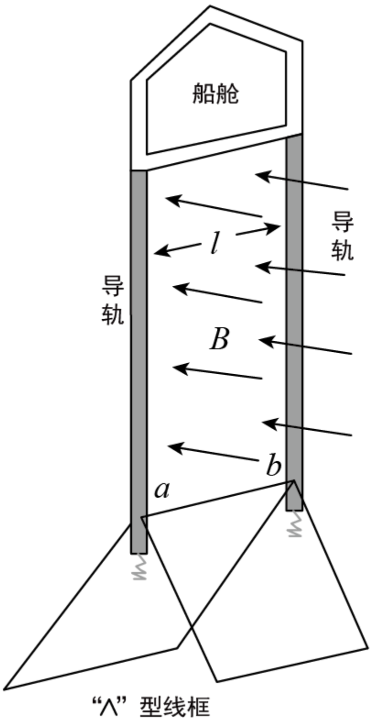
(1)[illegible]ab[illegible]E[illegible]

(2)[illegible]ab[illegible]I_0[illegible]

(3)[illegible]v[illegible]

(4)[illegible]C[illegible]

[illegible]$\acute{V}$[illegible]q[illegible]



[illegible](1)Blv_0[illegible](2)$\frac{Blv_0}{2r}$[illegible](3)$\frac{m_1gr}{3B^2l^2}$[illegible](4)$\frac{m_1gr}{3B^2l^2}$[illegible]$\frac{m_1grC}{6Bl}$

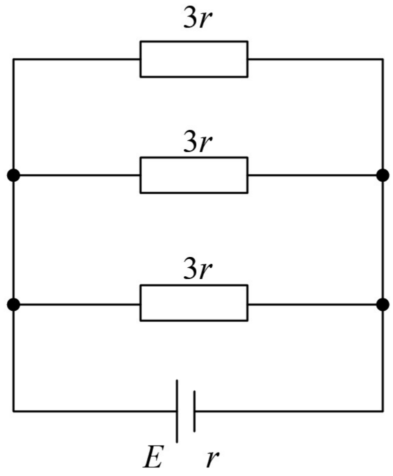
[illegible]

[illegible]

[illegible](1)[illegible]

$$E_0 = Blv_0$$

(2)[illegible]



□□□□□

$$R=2r$$

□□

$$I_0=\frac{E_0}{R}=\frac{Blv_0}{2r}$$

(3)□□□□□□□□□□□□

$$F_A=\frac{B^2l^2v}{2r}$$

□□□□□□□□□□□□m_1□□□□□$F=F_A$□□□□□□□□□□□□

$$F=\frac{m_1g}{6}$$

□

$$v=\frac{m_1gr}{3B^2l^2}$$

(4)□□□□□□□□□□□□□□□

$$v'=v=\frac{m_1gr}{3B^2l^2}$$

□□□□□□□□

$$U_C=\frac{1}{3}I\times3r=\frac{m_1gr}{6Bl}$$

□□□□

$$q=CU_C=\frac{m_1grC}{6Bl}$$

22. □□ B □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ E □□□ R_1 □ R_2 □□□□□□□□□□□□□□□□□□□□ M □ N □□ L □□ L □□□ O □□□□□□□□□□□ x □□ α □□□□□

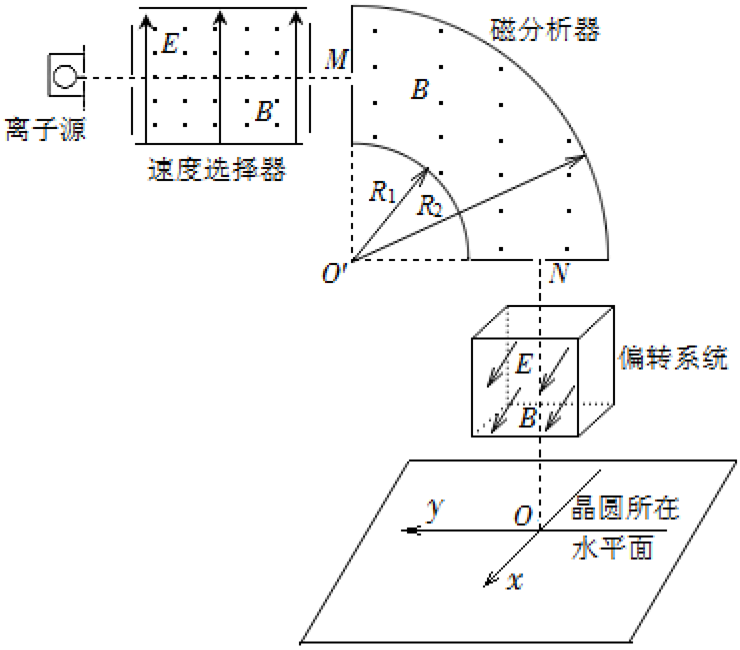
$\sin\alpha\approx\tan\alpha\approx\alpha$ □ $\cos\alpha\approx 1-\frac{1}{2}\alpha^2$ □□□

(1)□□□□□□□□□□□□□□□□□□□ v □□□□□□□□□□□□□□□□□□

(2)□□□□□□□□□□□□□□□□□□□□□□□□□□□□□(x□y)□□□

(3)□□□□□□□□□□□□□□□□□□□□□□□□□□□□□(x□y)□□□

(4)□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□(x□y)□□□□□□□□□□



□□□□(1) $\frac{E}{B}$ □ $\frac{2E}{(R_1+R_2)B^2}$ □(2)□ $\frac{3L^2}{R_1+R_2}$ □0□□(3)□0□ $\frac{3L^2}{R_1+R_2}$ □□(4)□□□

□□□□

□□□□

□□□□(1)□□□□□□□□□□□□

$$v=\frac{E}{B}$$

□□□□□□□□N□□□□□□□□□□

$$R=\frac{R_1+R_2}{2}$$

□$\frac{mv^2}{R}=qvB$□

$$\frac{q}{m}=\frac{v}{RB}=\frac{2E}{(R_1+R_2)B^2}$$

(2)□□□□□□□□□x□□□□□□□

$$x_1=\frac{1}{2}\frac{qE}{m}\left(\frac{L}{v}\right)^2$$

$$\tan\theta=\frac{qEL}{mv^2}$$

□□□□□□□□□x□□□□□□□

$$x_2=L\tan\theta=\frac{qEL^2}{mv^2}$$

$$x=x_1+x_2=\frac{3qEL^2}{2mv^2}=\frac{3L^2}{R_1+R_2}$$

□□□□□($\frac{3L^2}{R_1+R_2}$□0)

(3)□□□□□□□□□□□□□□

$$r=\frac{mv}{qB}$$

$$\sin\alpha=\frac{L}{r}$$

□□□□□□□□□y□□□□□□

$$y_1 = r(1-\cos\alpha) \approx \frac{L^2}{R_1+R_2}$$

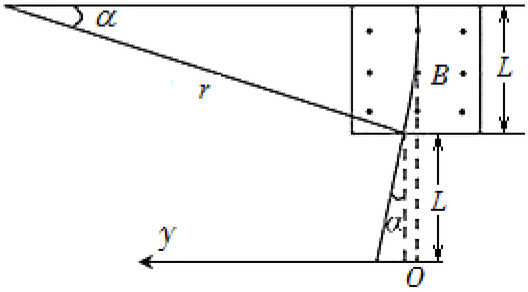
□□□□□□□□□y□□□□□

$$y_2 = L\tan\alpha \approx \frac{2L^2}{R_1+R_2}$$

□

$$y = y_1 + y_2 \approx \frac{3L^2}{R_1+R_2}$$

□□□□□(0□$\frac{3L^2}{R_1+R_2}$)



(4)□□□□□□□□□□□□($\frac{3L^2}{R_1+R_2}$□$\frac{3L^2}{R_1+R_2}$),□□□□□□□□□□□□y□□□□□□□□□□□□□